What is claimed is:

1. A catheter, comprising:

an elongate tubular member having a proximal end and a distal end; and

a deflectable tip at the distal end of the elongate tubular member, the deflectable tip comprising a first helical coil having a first diameter and a second helical coil having a second diameter, the first diameter being larger than the second diameter, the first and second helical coils being arranged in the manner of a double helix,

wherein, when viewed in cross-section, the first helical coil and the second helical coil are aligned at a first point on a circumference of each coil and misaligned at a second point on the circumference of each coil, where the second point is approximately 180 degrees from the first point.

2. The catheter of claim 1, wherein the alignment and misalignment repeats for successive turns of the double helix.

3. The catheter of claim 1, wherein the first helical coil and the second helical coil are bonded at least at one point of alignment on a turn of the double helix.

4. The catheter of claim 1, wherein the first helical coil and the second helical coil are bonded at the point of alignment on every second successive turn of the double helix.

5. The catheter of claim 1, wherein the first helical coil and the second helical coil are bonded at the point of alignment on every third successive turn of the double helix.

6. The catheter of claim 1, further comprising a dilatation balloon that communicates with an inflation lumen that extends to the proximal end of the catheter.

7. The catheter of claim 1, further comprising a control wire operable from the proximal end of the catheter and extending to the distal end of the catheter where the control wire is bonded at a distal region of the deflectable tip.

8. The catheter of claim 7, wherein the control wire extends through the deflectable tip and is disposed within an eccentric annulus between the first helical coil and the second helical coil within the circumferential region where the first helical coil and the second helical coil are misaligned.

9. The catheter of claim 7, wherein the control wire is a metallic wire.

10. The catheter of claim 7, wherein the control wire is a polymeric thread.

11. The catheter of claim 1, further comprising a radiopaque marker attached to a distal region of the catheter.

12. The catheter of claim 1, wherein the elongate tubular member further comprises a lumen extending between the proximal and the distal end.

13. The catheter of claim 12, further comprising a guidewire slideably disposed within the lumen of the elongate tubular member.

14. A method for catheterization of an artery, comprising the steps of:

providing a catheter comprising an elongate tubular member having a proximal end and a distal end, and a deflectable tip at the distal end of the elongate tubular member, the deflectable tip comprising a first helical coil having a first diameter and a second helical coil having a second diameter, the first diameter being larger than the second diameter, the first and second helical coils being arranged in the manner of a double helix, wherein, when viewed in cross-section, the first helical coil and the second helical coil are aligned at a first point on a circumference of each coil and misaligned at a second point on the circumference of each coil, where the second point is approximately 180 degrees from the first point;

advancing the catheter to a region of interest in the artery;

operating the control wire to direct the deflectable tip toward the region of interest; and

advancing a guidewire through the lumen of the catheter and into the region of interest.

15. The method of claim 14, wherein the region of interest is a lesion.

16. The method of claim 15, further comprising the step of dilating the lesion.

17. The method of claim 15, wherein the catheter further comprises a dilatation balloon, and wherein the method further comprises the steps of advancing the catheter over the guidewire to cross the lesion and expanding the balloon to dilate the lesion.

18. The method of claim 15, further comprising the steps of removing the catheter from the region of interest while maintaining the guidewire across the lesion, advancing an angioplasty catheter across the lesion, and dilating the lesion.

19. The method of claim 15, wherein the region of interest is a lesion, and wherein the method further comprises the steps of removing the catheter from the region of interest while maintaining the guidewire across the lesion, advancing a stent catheter across the lesion, and dilating the lesion with a stent.

20. The method of claim 14, wherein the region of interest is located in a coronary artery.

21. The method of claim 20, wherein the region of interest is located in a coronary artery selected from the group consisting of the left anterior descending, the left circumflex, the right coronary artery, the obtuse marginal, and the left main coronary artery.

22. The method of claim 14, wherein the region of interest is located in a carotid artery.

23. A catheter, comprising:

an elongate tubular member having a proximal region, a distal region, and a lumen extending therebetween;

a multilayer torque cable in the proximal region of the elongate tubular member, the multilayer torque cable having a first helical coil and a second helical coil, the first helical coil nested within the second helical coil and wound in a reverse direction from the second helical coil so that rotation of the first helical coil in a first direction causes the first helical coil to expand while rotation of the second helical coil in the first direction causes the second helical coil to compress and thereby interfere with the expansion of the first helical coil;

a monolayer helical coil in the distal region of the elongate tubular member; and

an outer jacket surrounding the monolayer helical coil to restrict expansion on rotation of the monolayer helical coil.

24. The catheter of claim 23, wherein the multilayer torque cable further comprises a third helical coil surrounding the second helical coil.

25. The catheter of claim 23, wherein the monolayer helical coil is annealed to prevent unwinding expansion on torquing the catheter.

26. The catheter of claim 23, wherein the first helical coil is multifilar.

27. The catheter of claim 23, wherein the second helical coil is multifilar.

28. The catheter of claim 23, wherein the monolayer helical coil is multifilar.

29. The catheter of claim 23, further comprising a balloon mounted on the distal region of the elongate tubular member, the balloon defining a chamber that communicates with an inflation lumen that extends to the proximal region of the elongate tubular member.

30. The catheter of claim 29, wherein a second outer jacket is disposed about the multilayer torque cable, and wherein a proximal end of the balloon is bonded to the second outer jacket and a distal end of the balloon is bonded to the outer jacket surrounding the monolayer helical coil.

31. A method for catheterization of an artery, comprising the steps of:

providing a catheter comprising an elongate tubular member having a proximal region, a distal region, and a lumen extending therebetween, the catheter having a multilayer torque cable in the proximal region of the elongate tubular member, the multilayer torque cable having a first helical coil and a second helical coil, the first helical coil nested within the second helical coil and wound in a reverse direction from the second helical coil so that rotation of the first helical coil in a first direction causes the first helical coil to expand while rotation of the second helical coil in the first direction causes the second helical coil to compress and thereby interfere with the expansion of the first helical coil, the catheter having a monolayer helical coil in the distal region of the elongate tubular member and an outer jacket surrounding the monolayer helical coil to restrict expansion on rotation of the monolayer helical coil;

advancing the catheter to a region of interest in the artery; and

applying torque to the proximal region of the catheter, wherein torque is transmitted through the multilayer torque cable in the proximal region of the elongate tubular member, and torque is transmitted through the monolayer helical coil in the distal region of the elongate tubular member.

32. The method of claim 31, wherein the catheter further comprises a deflectable tip at the distal end of the elongate tubular member, the deflectable tip comprising a first helical coil having a first diameter and a second helical coil having a second diameter, the first diameter being larger than the second diameter, the first and second helical coils being arranged in the manner of a double helix, wherein, when viewed in cross-section, the first helical coil and the second helical coil are aligned at a first point on a circumference of each coil and misaligned at a second point on the circumference of each coil, where the second point is approximately 180 degrees from the first point, and wherein the method further comprises the steps of advancing the catheter to a region of interest in the artery proximal a lesion, operating the control wire to direct the deflectable tip toward the lesion, and advancing a guidewire through the lumen of the catheter and into the lesion to cross the lesion.

33. The method of claim 31, further comprising the step of dilating a lesion at the region of interest.

34. The method of claim 31, wherein the catheter further comprises a dilatation balloon, and wherein the method further comprises the steps of advancing the catheter over a guidewire to cross a lesion at the region of interest and expanding the balloon to dilate the lesion.

35. The method of claim 31, further comprising the steps of removing the catheter from the region of interest while maintaining a guidewire across a lesion at the region of interest, advancing an angioplasty catheter across the lesion, and dilating the lesion.

36. The method of claim 31, further comprising the steps of removing the catheter from the region of interest while maintaining a guidewire across a lesion at the region of interest, advancing a stent catheter across the lesion, and dilating the lesion with a stent.

37. The method of claim 31, wherein the region of interest is located in a coronary artery.

38. The method of claim 31, wherein the region of interest is located in a coronary artery selected from the group consisting of the left anterior descending, the left circumflex, the right coronary artery, the obtuse marginal, and the left main coronary artery.

39. The method of claim 31, wherein the region of interest is located in a carotid artery.

40. A catheter, comprising:

a proximal handle;

a torque cable extending distally from the proximal handle; and

an outer jacket extending distally from the proximal handle and surrounding the torque cable with an annular gap disposed between the torque cable and the outer jacket, the annular gap allowing the torque cable to rotate independently of the outer jacket for at least a portion of the length of the outer jacket.

41. The catheter of claim 40, wherein the catheter further comprises a deflectable tip attached to the distal end of the torque cable.

42. The catheter of claim 40, wherein the catheter further comprises a control wire attached to the deflectable tip to cause deflection of the deflectable tip.

43. The catheter of claim 40, wherein the catheter further comprises a guidewire tube extending within the torque cable for at least a portion of a length of the torque cable.

44. The catheter of claim 40, wherein the torque cable is a multilayer torque cable comprising a first helical coil and a second helical coil, the first helical coil nested within the second helical coil and wound in a reverse direction from the second helical coil so that rotation of the first helical coil in a first direction causes the first helical coil to expand while rotation of the second helical coil in the first direction causes the second helical coil to compress and thereby interfere with the expansion of the first helical coil.

45. The catheter of claim 44, wherein the first helical coil is multifilar.

46. The catheter of claim 44, wherein the second helical coil is multifilar.

47. The catheter of claim 43, further comprising a balloon mounted on the distal region of the catheter, the balloon defining a chamber that communicates with the annular gap so that the annular gap functions as an inflation lumen.

48. A method for catheterization of an artery, comprising the steps of:

providing a catheter comprising a proximal handle, a torque cable extending distally from the proximal handle, and an outer jacket extending distally from the proximal handle and surrounding the torque cable with an annular gap disposed between the torque cable and the outer jacket;

advancing the catheter to a region of interest in the artery; and

applying torque to the proximal handle, wherein torque is transmitted through the torque cable with the outer jacket remaining stationary for a substantial portion of its length, the annular gap allowing the torque cable to rotate independently of the outer jacket.

49. The method of claim 48, wherein the catheter further comprises a deflectable tip at the distal end of the elongate tubular member, the deflectable tip comprising a first helical coil having a first diameter and a second helical coil having a second diameter, the first diameter being larger than the second diameter, the first and second helical coils being arranged in the manner of a double helix, wherein, when viewed in cross-section, the first helical coil and the second helical coil are aligned at a first point on a circumference of each coil and misaligned at a second point on the circumference of each coil, where the second point is approximately 180 degrees from the first point, and wherein the method further comprises the steps of advancing the catheter to a region of interest in the artery proximal a lesion, operating the control wire to direct the deflectable tip toward the lesion, and advancing a guidewire through the lumen of the catheter and into the lesion to cross the lesion.

50. The method of claim 48, further comprising the step of dilating a lesion at the region of interest.

51. The method of claim 48, wherein the catheter further comprises a dilatation balloon, and wherein the method further comprises the steps of advancing the catheter over a guidewire to cross a lesion at the region of interest and expanding the balloon to dilate the lesion.

52. The method of claim 48, further comprising the steps of removing the catheter from the region of interest while maintaining a guidewire across a lesion at the region of interest, advancing an angioplasty catheter across the lesion, and dilating the lesion.

53. The method of claim 48, further comprising the steps of removing the catheter from the region of interest while maintaining a guidewire across a lesion at the region of interest, advancing a stent catheter across the lesion, and dilating the lesion with a stent.

54. The method of claim 48, wherein the region of interest is located in a coronary artery.

55. The method of claim 48, wherein the region of interest is located in a coronary artery selected from the group consisting of the left anterior descending, the left circumflex, the right coronary artery, the obtuse marginal, and the left main coronary artery.

56. The method of claim 48, wherein the region of interest is located in a carotid artery.

57. A catheter, comprising:

an elongate tubular member having a proximal region, a distal region, and a lumen extending therebetween;

a multilayer torque cable in the proximal region of the elongate tubular member, the multilayer torque cable having a first helical coil and a second helical coil, the first helical coil nested within the second helical coil and wound in a reverse direction from the second helical coil, the torque cable having a first axial segment and a second axial segment distal the first axial segment, the second helical coil being wound around the first helical coil under higher tension in the first axial segment, the second helical coil being wound around the first helical coil under lower tension in the second axial segment, the second axial segment having a higher flexibility as compared with the first axial segment.

58. The catheter of claim 57, the first helical coil nested within the second helical coil and wound in a reverse direction from the second helical coil so that rotation of the first helical coil in a first direction causes the first helical coil to expand while rotation of the second helical

coil in the first direction causes the second helical coil to compress and thereby interfere with the expansion of the first helical coil.

59. The catheter of claim 57, wherein the multilayer torque cable further comprises a third helical coil surrounding the second helical coil.

60. The catheter of claim 57, wherein the first axial segment comprises about two-thirds of the torque cable.

61. The catheter of claim 57, wherein at least one of the first helical coil and the second helical coil is made from ribbon.

62. The catheter of claim 57, wherein the first helical coil and the second helical coil is made from one continuous wire.

63. A method for catheterization of an artery, comprising the steps of:

providing a catheter comprising an elongate tubular member having a proximal region, a distal region, a lumen extending therebetween, and a multilayer torque cable in the proximal region of the elongate tubular member, the multilayer torque cable having a first helical coil and a second helical coil, the first helical coil nested within the second helical coil and wound in a reverse direction from the second helical coil, the torque cable having a first axial segment and a second axial segment distal the first axial segment, the second helical coil being wound around the first helical coil under higher tension in the first axial segment, the second helical coil being wound around the first helical coil under lower tension in the second axial segment, the second axial segment having a higher flexibility as compared with the first axial segment;

advancing the catheter to a region of interest in the artery; and

applying torque to the proximal region of the catheter, wherein torque is transmitted through the multilayer torque cable in the proximal region of the elongate tubular member, and torque is transmitted through the monolayer helical coil in the distal region of the elongate tubular member.

64. The method of claim 63, wherein the catheter further comprises a deflectable tip at the distal end of the elongate tubular member, the deflectable tip comprising a first helical coil having a first diameter and a second helical coil having a second diameter, the first diameter being larger than the second diameter, the first and second helical coils being arranged in the manner of a double helix, wherein, when viewed in cross-section, the first helical coil and the second helical coil are aligned at a first point on a circumference of each coil and misaligned at a second point on the circumference of each coil, where the second point is approximately 180

degrees from the first point, and wherein the method further comprises the steps of advancing the catheter to a region of interest in the artery proximal a lesion, operating the control wire to direct the deflectable tip toward the lesion, and advancing a guidewire through the lumen of the catheter and into the lesion to cross the lesion.

65. The method of claim 63, further comprising the step of dilating a lesion at the region of interest.

66. The method of claim 63, wherein the catheter further comprises a dilatation balloon, and wherein the method further comprises the steps of advancing the catheter over a guidewire to cross a lesion at the region of interest and expanding the balloon to dilate the lesion.

67. The method of claim 63, further comprising the steps of removing the catheter from the region of interest while maintaining a guidewire across a lesion at the region of interest, advancing an angioplasty catheter across the lesion, and dilating the lesion.

68. The method of claim 63, further comprising the steps of removing the catheter from the region of interest while maintaining a guidewire across a lesion at the region of interest, advancing a stent catheter across the lesion, and dilating the lesion with a stent.

69. The method of claim 63, wherein the region of interest is located in a coronary artery.

70. The method of claim 63, wherein the region of interest is located in a coronary artery selected from the group consisting of the left anterior descending, the left circumflex, the right coronary artery, the obtuse marginal, and the left main coronary artery.

71. The method of claim 63, wherein the region of interest is located in a carotid artery.